

Sibling Adaptation to Childhood Cancer Collaborative Study: Health Outcomes of Siblings of Children With Cancer

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Objective: This seven-site study examined the overall health status, healthcare utilization, somatization, and health-risk behaviors of siblings of children with cancer compared to these factors in matched controls or normative data. The study also examined whether informants (i.e., siblings, parents, physicians) differed in their assessments of the above health domains.

Design: Subjects were 254 siblings of children with cancer from seven different pediatric oncology treatment centers that participated in the Sibling Adaptation to Childhood Cancer Collaborative study group. Predictors of the siblings' health status, healthcare utilization, somatization, and health-risk behaviors were identified, and the relationship between these health domains and the siblings' resiliency vs. dysfunctionality were explored via interviews.

Results: Overall, siblings were found to be moderately healthy, although siblings report significant problems with sleeping and eating. Healthcare utilization appears to be reduced for siblings. Most importantly, the parents of these siblings are less likely to seek medical help for a variety of conditions for which parents of control

children would bring their children to a doctor. A pattern emerged of parental underreporting of sibling health variables when compared to what the siblings themselves reported. When the relationship between health outcomes and the siblings' adaptation to their sick sibling's illness was examined, the resilient and dysfunctional groups significantly differed from each other. It appears that health outcomes are related to sibling adaptation to the changes brought about by their sick sibling's cancer diagnosis and treatment.

Conclusions: The focus of care for families of children with cancer is often limited to the child with cancer. As indicated in this study, the "healthy" siblings may be overlooked in the process. While parents appear to recognize that their "healthy" children are complaining more about aches and pains, they may have little energy or time to attend to the needs of these other family members. It is the intent of this study to document what clinicians may expect and to highlight the need for evaluation of this otherwise neglected group. © 1996 Wiley-Liss, Inc.

Key words: cancer, siblings, children, health, stress

INTRODUCTION

The psychological impact of childhood chronic illness on healthy siblings has been reported in several studies [1-4]. However, the impact of the illness crisis on the physical health and well-being of siblings of chronically ill children has received little attention. With increasing evidence that acute and repeated stressors may adversely affect health and general feelings of well-being [5,6], it is plausible that the growing population of siblings of children for whom cancer is a chronic rather than a necessarily immediately fatal illness may be at risk for health problems as well as emotional/behavioral problems. Additionally, the financial and emotional burdens placed on parents of chronically ill children may leave little reserve for other children in the family, especially if they appear relatively healthy and do not complain about physical symptoms (at least, not to the extent of their chronically ill sibling). This appearance of relative health and lack

of complaints (for whatever reason) may lead different informants to view the sibling's health-related problems differently. For example, there may be discrepancies be-

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tween parent and child assessments, with parents underreporting the health and physical symptomatology of their nonchronically ill children. Clearly, if parents minimize the extent of health problems in their nonchronically ill offspring, or, alternatively, if these children do not complain to their parents about physical symptoms, there may be altered patterns of healthcare utilization in comparison with families of well children even in the face of increased physical symptoms.

Considering the fact that not all siblings of chronically ill children would be expected to have the same degree of health problems, even if a higher overall morbidity were found in this population, the identification of particularly vulnerable subgroups of children at especially high risk for these problems would have implications for clinical intervention. This concept of individual differences in "stress vulnerability" has been described by Garmezy [7] and further discussed in relation to health outcomes by Boyce et al. [8]. A first step in identifying these potentially "at risk" children would be to consider the possible effects of those demographic and family variables that have been noted to be important factors in the general stress literature, especially in relation to illness vulnerability [9,10], injuries [11,12], and healthcare utilization [13–17]. In addition, because chronic illness can itself affect the financial status of a family [18] and contribute to the emotional and physical strain of parenting, family coping variables may have a moderating effect on sibling well-being. Furthermore, there may be added strains on the siblings associated with changes in family organization and roles as well as feelings and attitudes concerning their brother's/sister's illness (e.g., worries about the sibling dying, guilt, anger, jealousy) [19].

As part of a larger multisite study of siblings' emotional, academic, and social adaptation to childhood chronic illness, this study reports the health-related findings on siblings of children with cancer. Specifically, the following questions were addressed in this report: 1) Do siblings of children with cancer differ from controls in their overall health status, healthcare utilization, somatization, and health-risk behaviors? 2) Do informants (e.g., siblings, parents, physicians) differ in their assessment of the siblings' health status, healthcare utilization, and somatization? 3) What are the predictors of siblings' health status, healthcare utilization, somatization, and health-risk behaviors? and 4) Does behavioral/emotional dysfunction vs. resilience relate to siblings' health status, healthcare utilization, somatization, and health-risk behaviors?

MATERIALS

The outcome variables for this report include health status, healthcare utilization, somatization, and health-risk behavior as derived from items or scales from the

instruments/questionnaires described below. Independent variables include demographic, medical, and family relations data. The measures used in the Sibling Adaptation to Childhood Cancer Collaborative (SACC) study that pertain to this report are summarized as follows:

1. **National Health Survey Data:** Selected parent and child health-related items pertaining to parent and child health status, healthcare utilization, and somatization were taken from three national health surveys: 1) The Child Health Supplement administered in 1988 (CHS88) to 17,000 children as part of the National Health Interview Survey (NHIS) [20]; 2) The National Health and Nutrition Examination Survey (NHANES 1) administered to 6,900 parents in 1971–1975 [20]; and 3) The National Longitudinal Survey of Labor Force Behavior, Youth Survey, administered during 1979–1987 to 5,500 offspring of the original youth sample [21]. Examples of parent-reported items related to sibling health include (rated "mostly true" or "mostly false"): "my child's health is excellent"; "my child seems less healthy than other children I know"; "my child seems to resist illness very well." In addition, an identical 12-item symptom checklist was found in both the NHIS [20] (sibling self-report) and the NHANES [20] (parent report of sibling health). This checklist asked if each of 12 symptoms had been present during the past 12 months and each symptom was rated "not at all," "sometimes," "often," or "very often." The 12 symptoms were stomachache, sore throat, hurt all over, stiff neck/back, headache, vomiting, appetite loss, overtired, pain in chest, lump in stomach, blood in urine or bowel movement, and nervousness. These 12 symptoms and their ratings were used to comprise the Siblings Somatic Checklist and the Parent-Report of Siblings Somatic Checklist.
2. **Standardized Behavior Checklists:** The somatic subscales of the following instruments were utilized to obtain a measure of parent- and child-reported somatization. These measures have established normative data for nonclinical and clinical (i.e., referred for psychiatric problems) populations: 1) The Child Behavior Checklist (CBCL) [22] is a standardized parent-completed measure designed to evaluate the presence and intensity of behavioral/emotional problems and social and school competencies in children 6–16 years of age. Separate norms for clinical and nonclinical samples are provided for boys and girls and for age groupings 4–11 and 12–16 years. The somatic subscale of the CBCL is included for both genders and for all age groups. 2) The Youth Self-Report (YSR) [23] is an adolescent-completed version of the CBCL developed to measure the same behavioral/emotional and competency domains. This measure is intended for youth ages 12–16

years and is normed on clinical and nonclinical samples of the same age group.

3. **Family Measure:** Several standardized scales were used to assess family support, conflict, and emotional expressiveness. The Cronbach alpha estimate of internal consistency for the Family Relations Scale [24] used to assess family support is .87. The estimates for family conflict and emotional expressiveness scales range from .76 to .86 [25].
4. **Study-Developed Instruments:** Structured interviews of the siblings and parents included information about health habits, somatic complaints, school, and other items. Another measure, the Feelings and Attitudes Questionnaire [2] was included to assess the sibling's self-reported feelings, attitudes, and reactions to cancer in the family. Twenty-three of the 27 items in this questionnaire load on four factors: interpersonal, intrapersonal, communication, and fear of disease. The internal consistency alpha reliability coefficient for these factors is .86, .80, .67, and .65, respectively.
5. **Physician Measure:** A questionnaire was sent to the sibling's primary care physician to obtain health-related data. Specifically, items regarding the physician's impression of the sibling's overall health status (gleaned from his or her own review of office records of chief complaints and frequency of being seen), the presence of any chronic illness or symptom, and the recency of office visits were included.

METHODS

Subjects

Subjects were siblings of children with cancer from seven different pediatric oncology treatment centers that participated in the SACC study group (Children's Hospital of Los Angeles, University of Texas M.D. Anderson Cancer Center, St. Jude Children's Research Hospital, and the Universities of Michigan, Rochester, Utah, and California at Los Angeles). Approximately 40 siblings at each site (total 279) were invited to participate after written informed parental consent and child assent were obtained in accordance with the guidelines of the Human Subjects' Research Committee at each institution. Subjects were recruited between December 1989 to September 1990. Study entry criteria included: 1) sibling's living brother or sister diagnosed with cancer 4–42 months prior to study entry; 2) sibling 4–18 years of age; and 3) sibling and parent/guardian fluent in English. Selection of subjects was based on enrollment of the sibling most available and willing to participate in the study; no more than two siblings were accepted to avoid overrepresentation of a particular family. The sample was not stratified by age or gender, type of cancer, course of illness, or time since diagnosis. Data obtained on a final sample of 254 siblings

TABLE I. Demographics of the Study Population (N = 254)

Siblings	
Age (years)	5–18 (10.65)
Gender	Male 50.8%; Female 49.2%
Grade in school	K–college (5.6)
Birth order	First 52.8%; second 34.3%; >second 13.0%
Families	
Ethnicity	White 82.1% Hispanic 9.5% African-American 6.1% Other 2.3%
Religion	Protestant 44.1% Catholic 29.6% Mormon 14.0% Jewish 2.2% Other 10.1%
Marital status (via maternal status at study entry)	Married 80% Separated 5% Divorced, single 7% Divorced, remarried 6% Widowed 0.5% Never married 0.5%
Family type	Two-parent 87% Mother only 11% Other 2%
Socioeconomic status (Hollingshead scores)	1 (highest) 23% 2 37% 3 27% 4 9% 5 (lowest) 1% Unknown 3%
Child with cancer Diagnosis	ALL 43% Hodgkins' disease 10% Brain 8% Other 26% Neuroblastoma 4% Osteosarcoma 4% Non-Hodgkin's lymphoma

and their parents (representing 179 families), as well as a subsample of 180 reports from the primary physicians of these siblings, are presented in this report. Characteristics of the study sample are included in Table I. Matched-control samples for some of the study measures were selected from three national health surveys [20,21]. Each sibling in the study was classified according to eight variables: age, gender, race, birth order, family type, number of children, parental education, and geographic region. Each child in the national health survey also received a code based on these same variables. The sibling identification codes were compared against the codes in the survey file to identify exact matches. A total of 162 siblings had perfect matches from the control group. Relaxations of matching requirements resulted in identification of acceptable controls for the sibling subjects, with 97.3% matched on at least six variables. For detailed descriptions of subject selection and the process of match-

ing criteria with control samples, as well as the overall SACC study protocol, see Sahler et al [26].

Procedure

Participating siblings and their parents completed the structural interview and written measures in their home (51%), in the clinic (38%), by telephone interview (<1%), or by mailed questionnaires (11%). The identical protocol was used at each participating institution, and data were sent to a single data management site (University of Rochester) for quality control and analyses.

RESULTS

The findings will be presented in relation to the study questions below:

QUESTION 1: Do siblings differ from controls on health status, healthcare utilization, physical symptoms, and health-risk behaviors?

Health Status

In a series of questions regarding child health, parents of siblings rated their children as "less healthy" overall than did parents of control children ($t = 2.26$; $P < 0.03$). Siblings themselves also rated their "present health" as "good" or "excellent" less often than did controls ($t = 2.80$; $P < 0.01$). Specifically, siblings reported more "trouble sleeping" ($t = 2.81$; $P < 0.005$) and more "eating problems" ($t = 2.40$; $P < 0.02$) than did controls. Other items regarding health status included "resists illness," "accident prone," and "poisoning in the past 12 months." No significant differences were found in relation to these items.

Healthcare Utilization

Data concerning healthcare utilization of siblings and matched controls indicate that siblings reported themselves less likely to have received dental care during the past 2 years than did controls (61% vs. 75%; $P < 0.005$). In addition, as illustrated in Table II, parents of 254 siblings reported that they were less likely to take their sibling-child to a physician for a variety of symptoms than did parents of 254 controls. Chi-squares were used for comparison between expected and observed frequencies. Percentages are provided in the table for clarity.

Somatization

CBCL somatic scale scores of siblings were compared to those of clinical and nonclinical normative samples (Table III). In general, a pattern emerged whereby siblings, by both parent and self-reports, had higher somatization scores than nonclinical norms, yet lower scores than clinical normative samples. The exceptions to this were younger boys, whose parents reported somatization

TABLE II. Healthcare Seeking for Child Symptoms

Symptom	% Parents of siblings	% Parents of controls	<i>P</i>
Stomachache	25	51	<0.001
Sore throat	57	63	NS
Hurt all over	66	82	<0.001
Stiff neck/back	71	85	<0.001
Headache	23	27	NS
Vomiting	44	45	NS
Appetite loss	50	66	<0.001
Overtired	47	58	NS
Pain in chest	2	97	<0.05
Lump in stomach	99	100	NS
Blood in urine	99	100	NS
Nervousness	60	72	<0.004

similar to that in clinical samples, and adolescent boys, whose self-reports of somatization did not differ from those of the clinical norms; that is, the adolescent boys' scores were as high as the mean scores in the psychiatric (clinical) group.

Table IV includes CBCL T scores on the somatic subscale, all of which are in the range of approximately 1.5 standard deviations above the mean (50 ± 10) for a normal standard distribution.

Health-Risk Behaviors

Among interview questions asked directly of siblings, information regarding health-risk behaviors was elicited from children ages 12 and above. No siblings admitted to daily use of alcohol within the past 12 months, but 35% ($N = 8$) used alcohol more than once a month, while 65% ($N = 15$) used alcohol less than once a month. Thirty percent ($N = 7$) of siblings aged 12 and older admitted to using tobacco in the past 12 months, and 26% ($N = 6$) used tobacco more than once a month. The majority of siblings (44%, $N = 10$) used tobacco less than once a month.

QUESTION 2: Do siblings, parents, and the siblings' primary physician view sibling health status, healthcare utilization, and somatization in the same way?

Regarding ratings of siblings' general health, parent and sibling ratings were in the same general direction, 97% vs. 90% rated as excellent, respectively, with parents presenting a somewhat more favorable assessment than did the siblings (7% margin). Siblings' primary physicians rated the siblings' overall health as very good or excellent in 82% of cases (vs. 97% for parents and 90% for siblings). Seventy-seven percent of siblings report having seen a physician within the past 2 years while 91% of their own physicians report having seen them.

As for the parent- and sibling-rated somatic scales (CBCL and YSR), the correlation is positive, in the mod-

TABLE III. CBCL and YSR Somatic Scale Scores

	Clinical		Sibling		Nonclinical		P*
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	
CBCL somatic scale							
Boys 6-11	300	1.9 (2.3)	77	1.7 (2.1)>>	300	0.8 (1.3)	b
Boys 12-16	250	4.5 (4.6)>	53	2.4 (3.4)>	250	1.4 (2.0)	a
Girls 6-11	300	4.3 (3.9)>>	79	2.8 (2.7)>>	300	1.7 (2.0)	b
Girls 12-16	250	2.9 (2.9)>	43	1.4 (1.7)>>	250	0.6 (1.1)	a,b
YSR somatic scale							
Boys 12-16	366	5.5 (4.4)	75	5.3 (3.7)>>	388	3.7 (3.2)	b
Girls 12-16	379	8.5 (5.4)	60	7.2 (3.8)>	391	5.6 (3.9)	a

*Table reflects one-way ANOVAs (three groups) with post-hoc analyses (Scheffe test) of differences between groups. a (>) = $P < 0.01$; b (>>) = $P < 0.001$.

TABLE IV. CBCL and YSR Somatic Scale T-Scores

	Mean (SD)
CBCL	
Boys 6-11	63.12 (7.64)
Boys 12-16	70.54 (11.37)
Girls 6-11	72.84 (9.23)
Girls 12-16	62.37 (6.60)
Total	67.59 (9.97)
YSR	
Boys 12-16	49.22 (9.42)
Girls 12-16	53.97 (9.76)

erate range, and significant (Pearson $r = 0.35$; $P < 0.001$).

As shown in Table V, on the 12-item physical symptom checklist (1 to 4 intensity ratings: 1 = not at all, 4 = very often) described previously as part of the National Health Survey data [20], parents underrated the total number and intensity of their child's somatic symptoms, as compared to the siblings' self report. Due to the lack of normative data on this measure, it is not known whether this disparity between parents' and childrens' reports occurs in the general population as well.

QUESTION 3: What are some of the major predictors of siblings' health status, somatic complaints, and health-risk behaviors?

Three groups of predictor variables were used to construct predictive equations in the sibling health domains. The three predictor groups and the corresponding variables in each group, as well as the sibling health outcome variables, are presented in Table VI.

For each of the sibling health outcome variables, a hierarchical stepwise multiple regression was performed using all of the predictor variables, according to the following method: Group 1 Demographic variables were given the opportunity of entering the regression first (threshold for inclusion = $P < .05$), followed by Group

2 Medical, and then Group 3 Family variables, respectively. In Table VII, the variable "Diagnosis" used in the regression analysis refers to acute lymphoblastic leukemia (ALL) vs. all others. Because this was a regression, we chose a dichotomous variable as opposed to the nominal (seven group) variable "Diagnosis" that appears in Table I. One-way analyses of variance (ANOVAs) were run on all of the major outcome variables using "Diagnosis" as the independent variable. "Diagnosis" was used as a six-group variable (the seven diagnostic groups in Table I, minus the "Other" category). The diagnosis groups did not differ significantly on any of the outcomes. The only exception was that parents of Hodgkin patients rated siblings as being in poorer overall health than parents of ALL patients rated the siblings in their families. A summary of the results of these regression analyses is presented in Table VII.

Additionally, siblings were interviewed regarding their feelings and attitudes about their brother's/sister's illness [2]. The four subscales derived by factor analysis with representative examples are: Interpersonal Problems (e.g., "I feel people don't care how I feel"); Intrapersonal Problems (e.g., "I wish I were sick too"); Communication (e.g., "I can talk to my parents about my brother's/sister's cancer"); and Fear of Diseases (e.g., "I worry that I can catch cancer from my brother/sister"). These four factor scores were examined in relation to sibling somatization. Higher levels of sibling-reported somatic symptoms were associated with higher levels of sibling-reported interpersonal adjustment difficulties (YSR: $r = .41$; Sibling-Reported Symptoms: $r = .35$, both $P < .0001$, Pearson correlations).

QUESTION 4: Do siblings differ in their health status, healthcare utilization, somatization, and health-risk behavior according to their level of adaptation to their brother's/sister's cancer?

In another report from the SACC study group, a system was reported for classifying siblings according to their

TABLE V. Siblings' Somatic Symptoms (N = 254)

	Parent report	Sibling report	
	Mean (SD)	Mean (SD)	<i>t</i> *
Number of symptoms (0–12)	4.08 (2.17)	6.14 (2.45)	–11.50**
Total somatic index (12–48)	16.67 (2.96)	20.10 (4.30)	–12.15**

*Two-tailed *t*-test.

**DF = 248; *P* < 0.001.

TABLE VI. Predictor and Outcome Health Variables

Predictor variables
Group 1: Demographic: age, gender, socioeconomic status, ethnicity, 1/2-parent family, birth order
Group 2: Medical: diagnosis of the child with cancer, disease severity, time since diagnosis, on/off therapy
Group 3: Family: parental "well-being", parent somatic symptoms, parent health status, parent's own healthcare utilization, family support/expressiveness/conflict
Outcome variables
Parent-reported sibling illness history past year
Physician-reported sibling health status
Parent-reported healthcare utilization for sibling
CBCL somatic
YSR somatic
Parent-reported sibling somatic symptoms
Sibling-reported sibling somatic symptoms
Sibling-reported alcohol and tobacco use

level of emotional/behavioral adaptability [26]. Independent validation for the schema is provided by teacher reports of siblings' functioning in the school setting [Copeland, personal communication]. Siblings were divided into adaptation groups based on parental responses to questions related to sibling problems before and after the cancer diagnosis. Initially, four adaptation groups were derived from these responses: resilient, two intermediate groups (depending on whether or not a sibling had problems that pre-existed the diagnosis of cancer), and dysfunctional. Although the two intermediate groups were slightly different from each other in the predicted directions, we chose to collapse these two groups into a single intermediate group for data analyses (to allow sufficient sample size per cell). This system yielded three levels of adaptability of siblings to the experience of having a brother/sister with cancer: resilient (N = 77), intermediate (N = 110), and dysfunctional (N = 51). Resilient children were those who had no major problems before the diagnosis or had problems which remained the same or improved and who developed no problems afterwards. The dysfunctional group was comprised of those children who had problems before the diagnosis which worsened and/or who developed problems after the diagnosis that required treatment. The intermediate group were those children who may or may not have had problems before diagnosis and who developed problems

after diagnosis that did not receive treatment or for which treatment was not suggested. In the following series of analyses, an attempt was made to determine whether these emotional/behavioral adaptability groups were also related to health outcomes. One-way ANOVAs were performed on each of the major outcome variables in the health domains to test for differences across the three adaptability groups. Results are presented in Table VIII. Findings indicate that Adaptation groups differ on measures of physical symptomatology (CBCL Somatic, Parent, and Sibling reports of sibling symptoms).

DISCUSSION

Health Status

Health outcome data in the domains of health status, healthcare utilization, somatization, and health-risk behaviors were examined in this study of siblings of children with cancer. Overall, siblings were found to be moderately healthy, although significantly less healthy when comparing reports from their parents with those of parents of matched controls. Reports from the siblings themselves and from their physicians support the parents' evaluations, although a lower percentage of both informant groups (compared to parent reports) described the siblings' health as excellent or even very good. Siblings particularly report significant problems with sleeping (72% vs. 53% controls) and eating (42% vs. 26% controls).

Healthcare Utilization

Healthcare utilization also appears to be reduced for siblings of children with cancer. For example, they are significantly less likely to have received dental care during the past 12 months, compared to reports from matched controls. Most importantly, the parents of these siblings are less likely to seek medical help for a variety of conditions for which parents of control children would bring their children to a doctor. For example, only one fourth of siblings' parents would seek medical help if their non-cancer-diagnosed child had bad stomach pains, while over half of the control parents would do so. Only 66% of siblings' parents would bring their sibling-child to a doctor if the child complained of "hurting all over," while

TABLE VII. Predictors of Siblings' Health

Outcome variables	Predictor variables	Adjusted R ²	F
Parent-reported sibling illness history past year	Diagnosis	0.16	13.08*
Physician-reported sibling Health status	Parent somatic symptoms	0.13	13.59*
Parent healthcare Utilization for sibling	Family conflict (–)		
	SES (+)	0.32	20.43*
CBCL somatic	Parents' own utilization (+)		
	Mothers' "well-being" (–)		
	Parent somatic symptoms (+)	0.27	24.75*
	Mother's health status (–)		
YSR somatic	Mother's health status (–)	0.06	4.58**
Parent-reported sibling Somatic symptoms	Parent somatic symptoms (+)	0.22	36.97*
Sibling-reported sibling Somatic symptoms	None		
Sibling alcohol use	Age (+)	0.14	22.00*
Sibling tobacco use	Age (+)	0.08	12.11*

* $P < 0.001$.** $P < 0.05$.**TABLE VIII. Siblings' Health as a Function of Adaptation Level†**

Dependent variables	Dysfunctional	Intermediate	Resilient	F*
Parent-reported sibling illness history past year	1.33 (1.61)	0.96 (1.28)	0.51 (0.82)	7.13**
Physician-reported sibling Health status	1.86 (0.87)	1.90 (1.83)	1.88 (1.52)	0.01
Parent healthcare Utilization for sibling	25.12 (4.97)	24.64 (5.08)	24.88 (5.02)	0.16
CBCL somatic	2.61 (2.82)***	1.75 (2.09)****	0.81 (1.30)	12.04**
YSR somatic	4.46 (3.62)	4.17 (2.91)	3.41 (3.09)	1.09
Parent-reported sibling Somatic symptoms	18.20 (3.21)***	16.55 (2.89)	15.84 (2.13)	11.38**
Sibling-reported sibling Somatic symptoms	22.08 (4.96)***	20.17 (4.40)	18.84 (3.32)	8.90**
Sibling alcohol use	0.10 (0.30)	0.06 (0.25)	0.09 (0.29)	0.37
Sibling tobacco use	0.12 (0.33)	0.06 (0.25)	0.08 (0.27)	0.69**

†Scheffe post-hoc analyses were used for between-group comparisons.

*One-way ANOVAs.

** $P < 0.001$ (dysfunctional and resilient groups significantly different).***Dysfunctional and intermediate groups significantly different ($P < 0.05$).****Resilient and intermediate groups significantly different ($P < 0.05$).

82% of control parents reported that they would have their child seen by a physician.

Somatization

Somatization was found to be the health domain most affected for siblings of children with cancer. Examination of the somatic subscale of the CBCL (parent report) and the YSR form (adolescent self-ratings) [22,23], found that both males and females of all age groups had scores that were significantly higher than the nonclinical normative scores for that scale. In fact, for young boys (parent report) and for both male and female adolescents (self-report), the somatization scores matched the scores of the age- and gender-matched children referred to mental

health facilities because of psychiatric problems. Viewed from another perspective, the parent reports of the siblings' somatization (CBCL) were in the "clinical" range, indicating significant somatization (total T score of 68, with the clinical "cut-off" at 65). In addition to these standardized measures of somatization, a 12-item symptom checklist from a national data set was employed for both parent and sibling assessments. The siblings, as a group, reported having over half of all the symptoms.

Health-Risk Behaviors

Siblings of children with cancer evidence higher health-risk behaviors than normative data suggest. One small study of primarily Caucasians in the Midwest

showed 3% of adolescents using alcohol once a month or more, compared to 35% of siblings of children with cancer [Orr, personal communication]. In that same small study, 17.4% of adolescents use tobacco once a month or more, compared to 26% of siblings of children with cancer. Another survey with a more heterogeneous, but young adolescent (ages 11–14, $N = 640$) population indicated that 13.8% used tobacco once a month or more [27]. The National Institute on Drug Abuse figures from 1991 indicate that 33% of 8th and 10th graders combined ($N = 32,300$) used alcohol once a month or more (about equal to those reported by our study sample), but only 17% used cigarettes once a month or more [28], compared to the 26% usage in our sample. Thus, our study indicates that siblings of children with cancer appear to use tobacco significantly more than the norm.

Differing Views of Health Outcome Domains

In addition to support for health problems, over- and underutilization of healthcare services, and increased somatization overall for this population, the study examined the health outcome findings in relation to the sources of the data to determine if there were discrepancies among the informants. A pattern emerged of parental underreporting of sibling health variables when compared to what the siblings themselves reported, especially in the domain of physical symptoms. For example, siblings reported significantly more symptoms and with significantly greater severity than did their parents when asked about the somatic status of their healthy child. However, because there are no controls, the authors cannot verify that the findings are unique to siblings of children with cancer.

Health Outcome Predictors

It is probable that not every sibling of a child with cancer would be expected to have adverse health outcomes. Thus, it is important to examine the data to identify predictors of health problems in different domains. For the development of this predictor model, we initially selected for those factors, such as demographic and medical variables, that would have the least implications for intervention (e.g., these factors are difficult, if not impossible, to alter). After entering these variables in the model, we entered family factors which we deemed most amenable to intervention if needed. We found family conflict predicted physician reporting of sibling health status. Not surprisingly, siblings in families with high socioeconomic status utilized healthcare services most often. In general, mothers' health status and parental somatization predicted sibling somatization, while sibling age, as might be expected, predicted health-risk behaviors, such as alcohol and tobacco use.

As an added question, we examined the relationship between the siblings' physical symptomatology and their

feelings and attitudes about their brother's/sister's cancer. Specifically, we hypothesized that siblings who experienced both interpersonal and intrapersonal difficulties (i.e., siblings who indicated that they believed that people did not care how they felt) and those who feared their sick brother's/sister's cancer would be those siblings who might internalize their negative feelings (e.g., frustration, anger, fear) and thus have more physical symptoms. Indeed, this was the case, with significant correlations between sibling-reported somatic measures and positive responses to these groups of questions.

Overall Adaptation

Finally, this study addressed the relationship between health outcomes and the siblings' overall adaptation to their sick brother's/sister's illness. We found that in almost every health outcome domain, the resilient and dysfunctional groups significantly differed from each other. Additionally, on the parent-reported CBCL somatic scale, the dysfunctional group differed significantly from the intermediate group, and the intermediate group differed significantly from the resilient group. Thus, it appears that health outcomes differ depending upon sibling emotional/behavioral adaptation to the changes brought about by their sick sibling's cancer diagnosis and treatment.

While clinicians intuitively understand that the financial, emotional, and time burdens placed on all members of a family of a child with cancer might have differing effects across families and on different family members, the focus of care is often limited to the child with cancer. As indicated in this study, the "healthy" siblings may get overlooked in the process, both in terms of recognition of their physical symptoms by their parents and in terms of receiving medical and dental attention. While parents appear to recognize that their "healthy" children are complaining more about aches and pains, they may have limited resources to attend to the needs of these other family members. For example, the financial burden placed on the family by the illness might limit financial resources for other needs. Additionally, healthy siblings' symptoms may pale in comparison to the meaning of the ill siblings' symptoms. This hypothesis is supported by the finding of a relationship between siblings' feelings that no one cares about them and the siblings' physical symptoms. Further internalization of feelings that are not heard and not addressed can become compounded when there are fears about the cancer itself, as noted by the increased physical symptoms found in siblings who feared their sick brother's/sister's cancer. Children usually turn to their parents for support, nurturing, and guidance in attempts to feel better when they feel sick. However, as this study found, if their parents are already not feeling well themselves and have their own physical symptoms to worry about, in addition to caring for and worrying about their child with cancer, little energy may remain for the rest of the children. There is a clear need for

future research as to factors that may contribute to healthy siblings' complex experiences in families with an ill child.

The findings of this study indicate directions for intervention. First, because the siblings' physicians are seeing these children less often but 18% of physicians are reporting that siblings have less than very good or excellent health, every physician visit needs to be utilized to its fullest. Regardless of the reason for the visit, there should be an opportunity for the sibling to talk alone with the physician to explore physical and emotional well-being, especially feelings about the cancer experience and its effect on the family. The parents' own health and well-being should be addressed, because parental health status affects sibling health outcome, especially in relation to physical symptoms such as recurrent pains. Healthcare providers at pediatric oncology centers often focus primarily on the sick child. However, it is important for these staff to remind the parents to take care of themselves as well and to help them devise appropriate strategies for doing so (e.g., with respite help in caring for the child with cancer). In taking care of themselves, parents may be able to provide more support for the otherwise relatively neglected siblings.

In summary, this study supports the findings of other studies of siblings of chronically ill children: that these children are at risk for emotional, behavioral, and also health-related problems. Of particular interest, especially in times of economic recession, is the identification of particularly vulnerable youngsters. These children should be targeted for prevention and intervention before the cancer disrupts their daily functioning. It is the intent of this study to document what clinicians may expect from these children and to highlight the need for more systematic physical and emotional evaluation as part of routine health care or of care provided in response to specific, especially recurrent, symptoms which may be serving as a cry for help.

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